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THE SYSTEMATICS OF *TROGODERMA AFRUM* PRIESNER AND *T. GRANARIUM* EVERTS (COLEOPTERA: DERMESTIDAE)

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AND

A. Badawy

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The common *Trogoderma* found in Egypt has been described by Priesner (1951) as *T. afrum*. It is similar in many ways to *T. granarium* Everts, but differs in the shape of the antennae. In *T. granarium* the intermediate segments are much more slender in both sexes, so that the club is more differentiated from the other antennal segments than in *T. afrum*. Howe and Burges (1956) believed that the marked difference in the shape of the antennae recorded by Priesner might be due to a difference in the position of the antennae when drawn. In living specimens the elytral pattern in the two species was similar, but it often faded or disappeared in dried specimens of *T. granarium*. Crosses between the two species produced fertile individuals. They concluded, therefore, that the more recently described species should be considered a synonym of *granarium*.

In 1955 living specimens of the common Egyptian *Trogoderma* were sent to Dr. R. W. Howe, and in a personal communication he stated that they fitted Priesner's description. It was felt desirable, therefore, to carry out a further study before accepting either of the two opinions.

A pure culture of typical *T. granarium* was kindly sent by Mr. H. D. Burges and a sample of the common Egyptian *Trogoderma* was obtained from Upper Egypt, where it is considered a major pest of stored products. Before starting any experimental or biometric work, cultures of the two insects were bred on whole-meal flour for several generations at 35° C. and 70 per cent. R.H.

Comparison between *T. afrum* and *T. granarium*

1. Table I gives the mean width of the segments of the flagellum; the scape and pedicel were excluded. It can be seen that those of *afrum* are, as a rule, much wider than those of *granarium*. The antennal segments of male *afrum* increase gradually in width towards the apex, whereas those of *granarium* start to increase more or less abruptly after the fourth segment. In the female, however, the fourth segment in *afrum* is much wider than the preceding ones; in *granarium* the first four segments are approximately equal in width, the second tending to be somewhat narrower. The difference in antennal shape shows clearly if the width of each segment of *afrum* is compared with that of the corresponding segment of *granarium*. This is shown graphically in figures 1 and 2 (*see also* figs. 3 and 4).

The ninth segment of the flagellum has a characteristic shape. It is nearly triangular, tapering towards its apex and in males much longer than broad. Table II gives the mean width and length of this segment in the two forms. In both sexes of each form the width is more or less constant but the length is widely different in sexes and forms.

2. The mean width of the flagella (sum of the widths of all segments/9) of 30 individuals of each form was calculated (Table III). Individuals were grouped into

TABLE I.—*Mean width of flagellar segments of* T. afrum *and* T. granarium *in microns*
(means of 30 observations)

Male

Segment	*afrum* Mean	*afrum* S.E.	*afrum* Range	*granarium* Mean	*granarium* S.E.	*granarium* Range	Ratio *afrum*/*granarium*
1	35·54	0·3699	32·26–38·71	30·86	0·3700	27·42–35·49	1·15
2	37·47	0·3959	32·26–41·94	31·34	0·4003	27·42–35·49	1·20
3	42·74	0·4284	38·71–47·58	33·23	0·3875	29·84–38·71	1·29
4	50·33	0·5718	45·16–56·45	35·65	0·5355	29·84–45·16	1·41
5	60·70	0·6720	54·03–67·75	45·70	0·8323	38·71–56·45	1·33
6	73·55	0·8187	64·52–87·10	60·43	1·0002	48·39–72·58	1·22
7	85·35	0·8191	75·81–93·55	76·43	0·9940	62·91–87·10	1·12
8	88·90	1·0028	77·42–98·39	82·18	0·7756	70·16–87·10	1·08
9	78·88	0·9129	70·97–90·33	75·11	0·6988	67·75–80·65	1·05

Female

Segment	*afrum* Mean	*afrum* S.E.	*afrum* Range	*granarium* Mean	*granarium* S.E.	*granarium* Range	Ratio *afrum*/*granarium*
1	35·11	0·3788	29·03–38·71	31·78	0·2829	29·03–35·49	1·10
2	35·67	0·5035	29·03–38·71	30·05	0·2769	25·81–32·26	1·19
3	38·74	0·4727	32·26–45·16	31·99	0·3003	29·03–35·49	1·21
4	44·03	0·5386	38·71–50·00	33·68	0·3419	30·65–38·71	1·31
5	54·46	0·6455	45·16–61·29	43·63	0·4727	38·71–48·39	1·25
6	75·25	1·0540	58·07–90·33	62·05	0·9933	51·62–70·16	1·21
7	90·14	0·9980	72·58–100·01	84·60	0·8341	70·97–93·55	1·07
8	93·88	0·8495	82·26–100·01	90·81	0·8351	80·65–100·01	1·03
9	78·04	0·6340	70·97–83·88	74·98	0·6780	66·94–84·68	1·04

TABLE II.—*Length and width of ninth segment in microns*
(means of 30 observations)

Male

Form	Width Mean	Width S.E.	Width Range	Length Mean	Length S.E.	Length Range
afrum	78·88	0·9129	70·97–90·33	122·40	1·1085	109·68–132·27
granarium	75·11	0·6988	67·75–80·65	113·15	1·3245	93·55–129·04
*A*1	71·32	0·6058	64·52–77·42	106·40	1·1016	96·78–117·75
*B*1	75·46	0·7987	67·75–83·88	109·79	0·9524	100·01–122·59

Female

Form	Width Mean	Width S.E.	Width Range	Length Mean	Length S.E.	Length Range
afrum	78·04	0·6340	70·97–83·88	87·24	0·9143	74·20–92·75
granarium	74·98	0·6780	66·94–84·68	77·40	0·7412	70·97–87·10
*A*1	73·42	0·6253	66·13–79·84	78·77	0·7412	72·58–92·75
*B*1	75·06	0·7519	69·36–83·88	78·96	0·6581	70·97–87·10

*A*1, First generation of the cross, male *granarium* × female *afrum*.
*B*1. First generation of the reciprocal cross, male *afrum* × female *granarium*.

TABLE III.—*Mean width of flagella in microns*
(means of 30 observations)

Form	Male			Female		
	Width	S.E.	Range	Width	S.E.	Range
afrum . .	61·50	0·5355	55·29–68·37	60·59	0·5788	50·99–67·56
granarium . .	52·33	0·5630	44·98–59·86	53·74	0·4283	48·21–58·07
*A*1 . . .	52·90	0·3468	49·02–56·63	55·14	0·3699	50·63–58·25
*B*1 . . .	55·73	0·6202	51·08–62·91	56·47	0·6519	47·22–64·88

*A*1, *B*1, as in Table II.

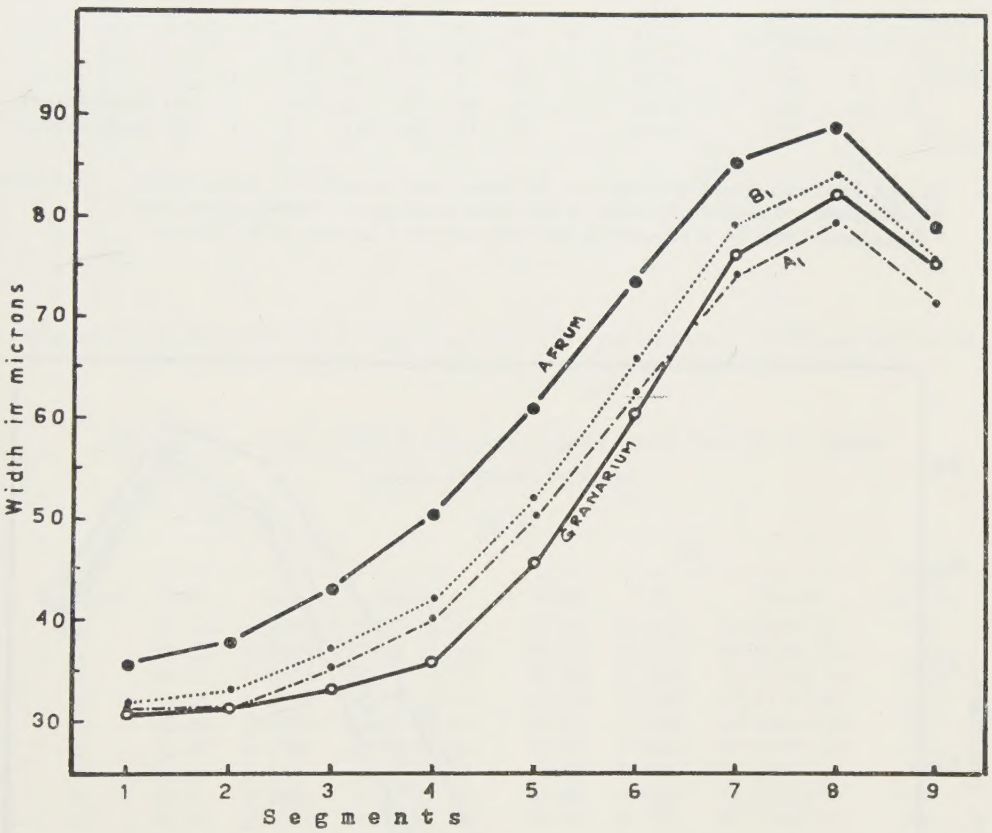


FIG. 1.—Mean width of segments of flagella of male *T. afrum*, *T. granarium* and F_1. *A*1, the first generation of the cross (♂ *granarium* × ♀ *afrum*); *B*1, the first generation of the reciprocal cross (♂ *afrum* × ♀ *granarium*).)

classes, each with a range of 3 microns. The frequency distribution curves (fig. 5) show the nature of the variation.

3. In *granarium* the first four segments are slender in form so that the club is well differentiated. In *afrum*, however, these segments increase successively in width, and the club is therefore less clearly differentiated. The increase from the first to the fourth segment was computed. These differences were grouped into classes with a range of 3 microns for the male and 2 microns for the female. Table IV and figure 5 show that each form has its characteristic mode; very few individuals overlap and more than 80 per cent. can be classified as belonging to one or the other of the two forms.

TABLE IV.—*Total increase in width from first to fourth segment in microns*

(means of 30 observations)

Sex	Form	Mean increase	Distribution of differences I	II	III	IV	V	VI	VII	VIII*	
Male	*afrum*	14·78	.	.	.	1	7	17	5	.	
	granarium	4·75	1	13	13	3	.	.	.	.	
	*A*1	8·92	.	.	8	18	4	.	.	.	
	*B*1	10·13	.	.	3	17	9	1	.	.	
	*A*2	7·87	2	12	19	13	8	4	2	(60 observations)	
	*B*2	8·47	.	5	19	24	8	3	1	(60 observations)	
Female	*afrum*	8·99	.	.	.	2	7	14	4	3	
	granarium	1·87	3	13	11	3	.	.	.	.	
	*A*1	4·65	.	4	4	16	3	3	.	.	
	*B*1	5·05	.	3	4	13	5	4	1	.	
	*A*2	5·23	.	3	16	19	12	9	1	(60 observations)	
	*B*2	5·07	.	3	17	20	11	8	1	(60 observations)	

*A*1, *A*2, First and second generation of the cross, male *granarium* × female *afrum*.
*B*1, *B*2, First and second generation of the cross, male *afrum* × female *granarium*.
* The classes differ by 3 microns in the male and by 2 microns in the female.

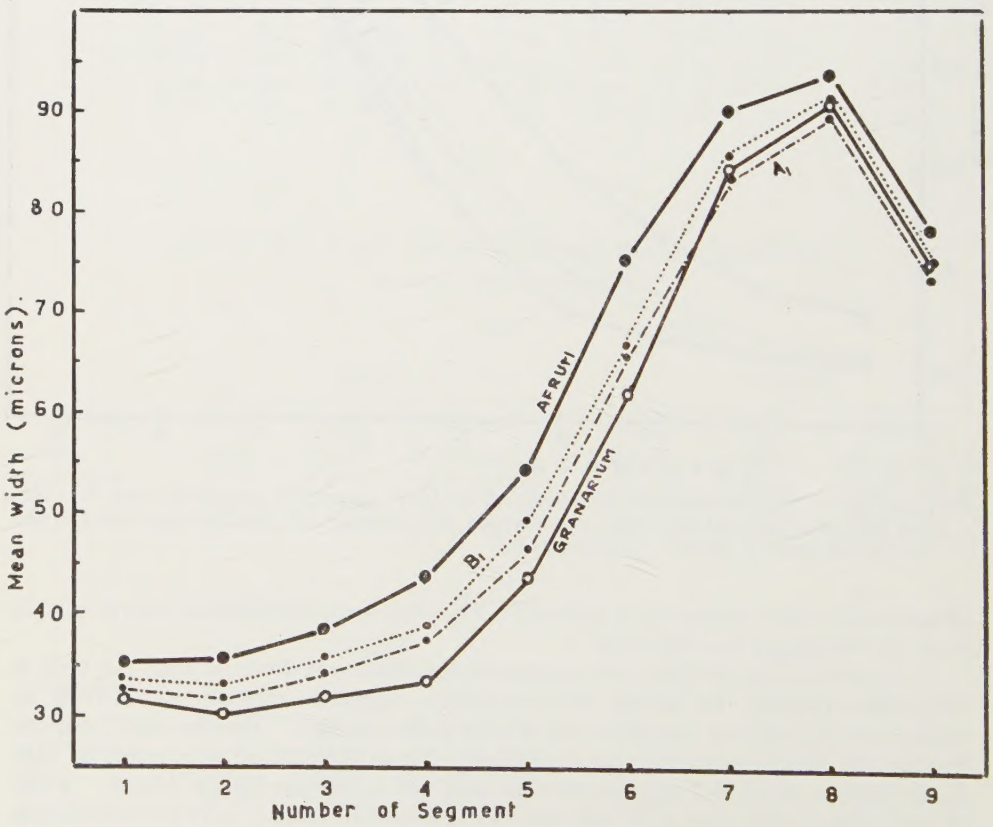
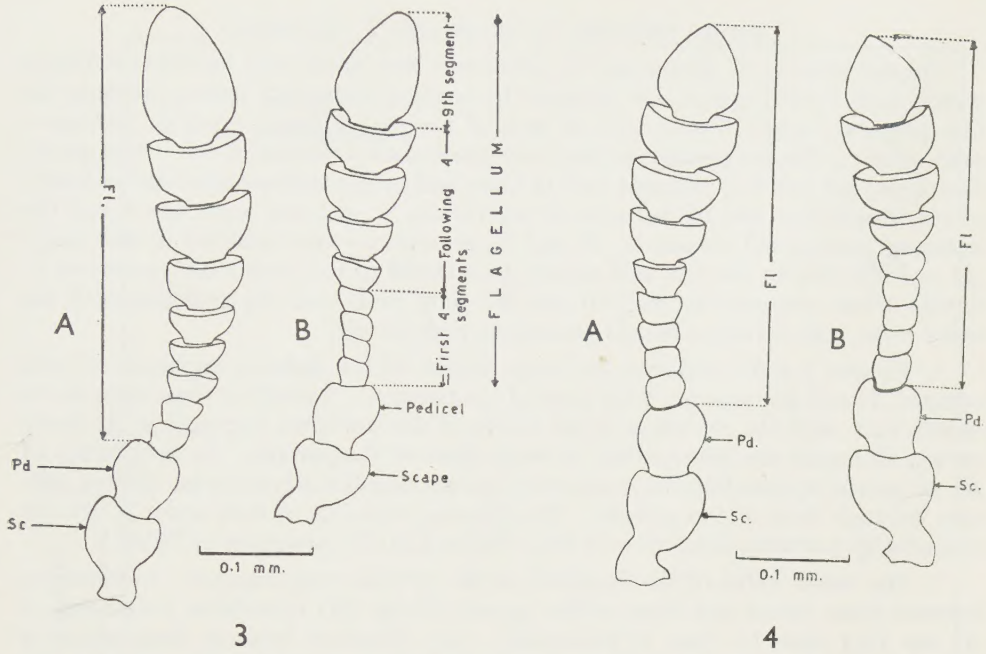


FIG. 2.—Mean width of segments of flagella of female *T. afrum*, *T. granarium* and F_1. (*A*1 and *B*1 as in fig. 1.)



FIGS. 3-4.—(3) Male antenna of: (A) *T. afrum*; (B) *T. granarium*. (4) Female antenna of: (A) *T. afrum*; (B) *T. granarium*. (*Sc*, scape; *Pd*, pedicel; *Fl*, flagellum).

TABLE V.—*Mean width of segments of flagellum of hybrids in microns*
(means of 30 observations)

Male

Segment	*A*1 Mean	*A*1 S.E.	*A*1 Range	*B*1 Mean	*B*1 S.E.	*B*1 Range	Ratio *A*1/*B*1
1	31·18	0·2774	28·23–33·87	31·94	0·4691	29·03–38·71	0·98
2	31·29	0·3164	27·42–35·49	33·09	0·5570	29·03–40·32	0·95
3	35·14	0·3875	30·65–40·32	37·13	0·5478	33·07–45·16	0·95
4	40·11	0·3605	35·49–43·55	42·10	0·5630	38·71–48·39	0·95
5	50·38	0·4726	45·97–54·84	52·15	0·7861	45·16–67·75	0·97
6	62·77	0·4799	58·07–67·75	66·02	0·9933	56·45–77·42	0·95
7	74·47	0·6688	66·94–80·65	79·36	0·8756	70·97–87·10	0·94
8	79·41	0·7355	70·97–87·10	84·36	0·9187	77·42–93·55	0·94
9	71·32	0·6058	64·52–77·42	75·46	0·7987	67·75–83·88	0·95

Female

Segment	*A*1 Mean	*A*1 S.E.	*A*1 Range	*B*1 Mean	*B*1 S.E.	*B*1 Range	Ratio *A*1/*B*1
1	33·12	0·3416	29·03–36·29	33·90	0·4165	29·03–38·71	0·98
2	31·96	0·2651	29·03–34·68	33·23	0·4397	29·03–38·71	0·96
3	34·46	0·3167	32·26–37·10	35·97	0·4399	31·45–41·94	0·96
4	37·80	0·4085	33·07–43·55	38·98	0·4763	34·68–45·97	0·97
5	46·59	0·5001	41·13–50·81	49·30	0·7303	41·13–58·07	0·95
6	65·94	0·7095	57·26–74·20	67·05	0·8173	62·10–77·42	0·98
7	83·55	0·6216	78·23–90·33	85·68	0·0266	77·42–100·01	0·98
8	89·44	0·8631	79·84–96·78	91·37	0·8569	83·07–103·23	0·98
9	73·42	0·6253	66·13–79·84	75·06	0·7519	69·36–83·88	0·98

*A*1, *B*1, as in preceding Tables.

Crosses between *T. afrum* and *T. granarium*

Crosses between *T. afrum* and *T. granarium* were made and maternal influence within each hybrid group was balanced by making reciprocal crosses between the two parental forms. Twenty-five of each of the two different types of matings—male *afrum* × female *granarium* and male *granarium* × female *afrum*—were made. Batches of not less than 100 eggs each of those laid by the two matings were isolated ; whole wheat flour was offered and 30 individuals of each sex were taken and the antennae severed and mounted. F_1 and F_2 generations were obtained in each case ; $A1$ and $A2$ refer to the first and second generations of the cross male *granarium* × female *afrum*, respectively, and $B1$ and $B2$ refer to F_1 and F_2 generations of the other cross, male *afrum* × female *granarium*, respectively.

1. Figures 1 and 2 indicate the mean widths of the flagellar segments of both sexes of $A1$ and $B1$, together with those of the parents. A study of these data shows clearly that, with the exception of the widths of the last three segments in $A1$ (both sexes), all means are intermediate between those of the parents. In both sexes of $B1$ all points representing the mean width of the flagellar segments are always halfway between those of the parents. The flagellar segments of both sexes in $A1$ are consistently narrower than those of $B1$. Ratios ($A1/B1$) are given in Table V.

2. The mean width of the flagellum of the hybrids was obtained. Comparison between these means and those of the parents (Table III) shows that both sexes of $A1$ are very close to those of *granarium* ; the difference between their means is insignificant. The means of $B1$ in males and females differ significantly at 1 per cent. level from both parents. Means for females of both $A1$ and $B1$ are nearly equal, but those of males are significantly different.

3. The shape of the first four segments has changed in the hybrids. This is shown by computing the increase in width from the first to the fourth segment, the differences being grouped into classes with a range of 3 microns for the male and 2 microns for the female (Table IV). Populations of the two hybrids were found to occupy the intermediate classes and have the same or, in $A2$, very nearly the same modes.

4. Ratios, b for club/b for stem (b being the regression coefficient) for both F_1 hybrids are approximately equal, being always intermediate between those of their parents ; the figures 3·23 and 3·18 were obtained for males, and 8·91 and 8·04 for females of $A1$ and $B1$, respectively. In the parents the ratios were 7·74 and 1·94 for male *granarium* and *afrum*, respectively, whereas the corresponding values were 21·31 and 4·47 in the female.

In the second generation, $A2$ and $B2$, the variation in the shape of the antenna is expressed by computing the increase in width from the first to the fourth segment. Results are given in Table IV. It can be seen that the values lie between those of the parents but are more variable than in F_1, as shown by the spread of the distribution of differences in males and females.

Breeding was continued and up to the sixth generation fertile adults were obtainable.

The conclusions which can be drawn from this study are that : (1) *T. afrum* and *T. granarium* differ markedly in the shape of the antennae ; (2) the characters of the F_1 and F_2 generations show that the difference between the two forms is genetically determined, and, since crosses between *afrum* and *granarium* produced fertile cultures for several generations, they must be regarded, not as two different species, but as " forms " of a single species. It is, therefore, proposed that *afrum* should be considered a sub-species of *T. granarium* (*T. granarium afrum* Priesner), a synonym of *T. afrum* Priesner, and that *T. granarium* Everts be named *T. granarium granarium* Everts.

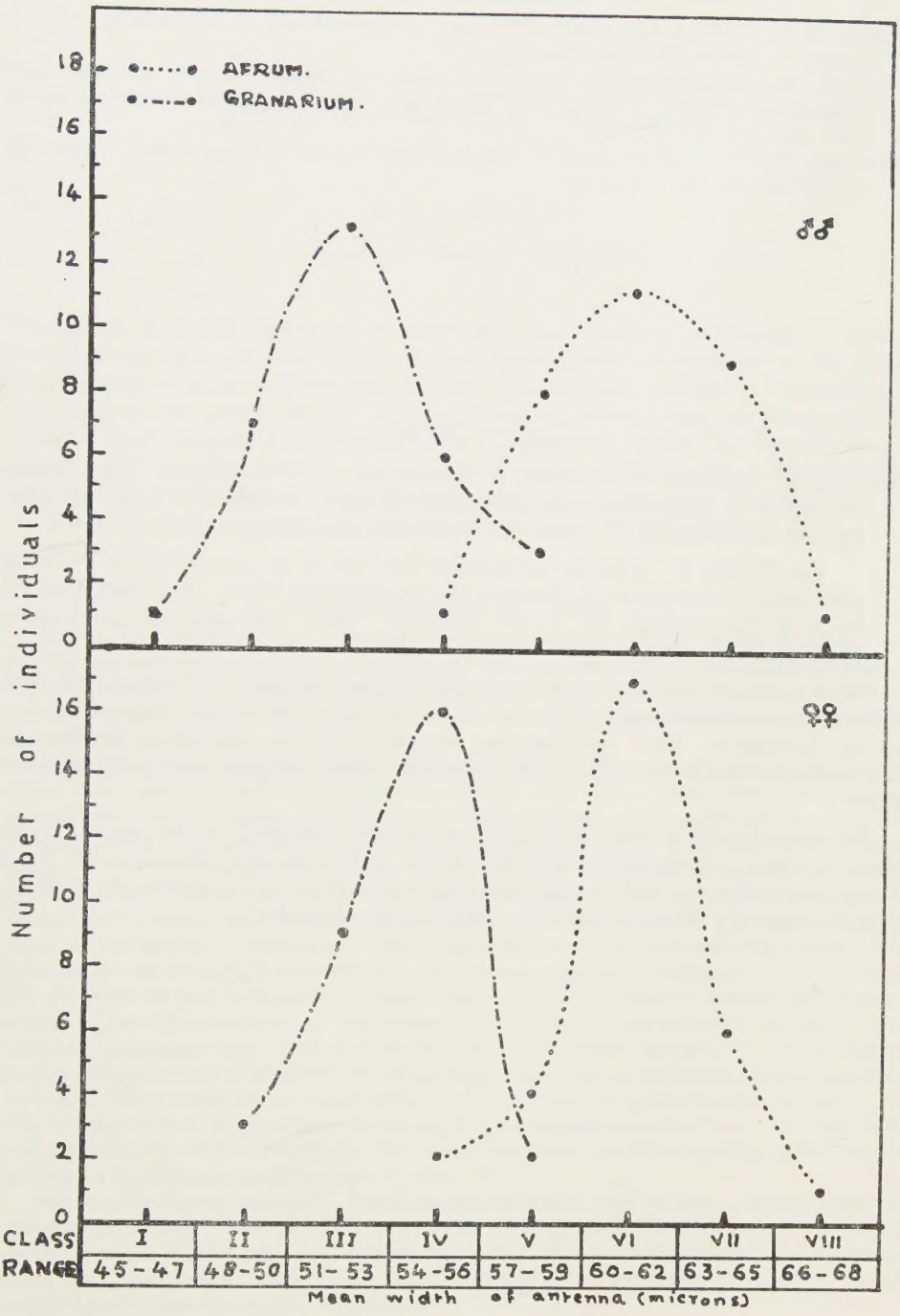


FIG. 5.—Frequency distribution curves of the mean widths of the flagella of *T. afrum* and *T. granarium*.

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Priesner, H., 1951, Description of the common Egyptian *Trogoderma*. *Bull. Soc. Fouad 1er Ent.* **35** : 133–135.

Book Notice

University of California Publications in Entomology. Vol. 16, No. 5. The feeding behaviour of *Hippodamia quinquesignata* (Kirby) larvae. By I. K. Kaddou. Pp. 181–232, text illust. 8vo. Berkeley and Los Angeles. Price $1.00.

Vol. 17, No. 1. A revisional study of the bees of the genus *Perdita* F. Smith, with special reference to the fauna of the Pacific Coast (Hym., Apoidea), Part IV. By P. H. Timberlake. Pp. 1–156, text illust. 8vo. Berkeley and Los Angeles. Price $3.00.

These works are among the most recent additions to the *University of California Publications in Entomology*. The first is a record of laboratory experiments on feeding behaviour, food consumption, host preferences, searching habits and cannibalism in the larvae of the aphidophagous species *Hippodamia quinquesignata* (Kirby).

The second work is the continuation of a revisional study of the genus *Perdita*, previous parts of which appeared in Vol. 9, No. 6, Vol. 11, No. 5 and Vol. 14, No. 5. It contains a key to, and descriptions of, species of the *octomaculata* group of the typical subgenus ; 99 species and 34 subspecies are described.

A NEW SPECIES OF *GREENIELLA* COCKERELL (ASPIDIOTINI : COCCOIDEA : HOMOPTERA) FROM MALAYA

By D. J. Williams

(*Commonwealth Institute of Entomology*)

The genus *Greeniella* Cockerell, containing a small number of peculiar species, is placed in the tribe Aspidiotini on the characters of lobes and plates of the second stage female. In the adult female the only clue to tribal position is to be found in the shape of the minute ducts. It is not possible, at this stage, to homologise the parts of the pygidium with those of other Aspidiotine species and identification is based mainly on the form of the projections around the margin. The following species, collected in Malaya, supports the view that the genus is Oriental.

The holotype is deposited in the British Museum (Natural History).

Greeniella ramosa sp. n. (Fig. 1)

Scale composed of exuviae of second stage female enclosing adult female, ovoid but with anterior end more or less straight and with a small triangular shaped lobe projecting from posterior edge, becoming hard and slightly convex ; colour pale orange ; exuviae of first stage dark brown, situated towards anterior end. Occurring on the under surfaces of the leaves and with the anterior ends touching the midribs. Male scale not seen.

Body of adult female about 1·5 mm. wide, elongate-oval, the postero-lateral margins forming slight lobes. Antennae set close to anterior margin, each with a short, blunt seta. Anterior spiracles each with 1–3 pores. Pygidium small and projecting a little posteriorly to lateral lobes of body ; sides subparallel, posterior end rounded, terminating in 7 projections of a distinctive shape. The 5 posterior projections with parallel sides and each about one quarter the length of pygidium ; median projection with 3 small apical finger-like processes which are not bilaterally symmetrical ; second pair of projections each with 4 such processes and third pair each with 5 margins of projections sclerotised and outer lateral margins of third pair each with a small pointed prominence resembling an Aspidiotine lobe ; fourth pair of projections short, each with 3–4 finger-like processes varying in length in different specimens, inner posterior margins with a pair of sclerotised lobe-like prominences. Single dorsal setae present on inner lateral margins of second and third projections and a pair of short setae on inner margins of each of fourth projections. Small numbers of slender minute ducts arising from each projection but external openings difficult to locate. Short microducts present anterior to pygidium on posterior edges of body. Anal ring situated at base of pygidium, surrounded by a triangular sclerotised area. Ventral surface with no distinctive characters except a few triangular shaped points resembling gland tubercles, anterior to pygidium on posterior edge of body.

Second stage female turbinate. Pygidium pointed with 3 pairs of lobes ; median lobes small and rounded apically ; second pair of lobes about twice size of median lobes, each with a notch on outer margin ; third pair of lobes wide and short. Plates apically fringed and longer than lobes, there being a pair between each pair of lobes and a pair anterior to third lobes. A series of short points situated anterior to pygidium.

Malaya : Bukit Mertajam, on *Myristica fragrans*, 18.vi.1927.

This species differs from others in the genus *Greeniella* in possessing finger-like processes at the apices of the lobe-like projections. It comes closest to *G. cornigera* (Green), described from Ceylon, a species also with five long projections, but these are rounded at the apices.

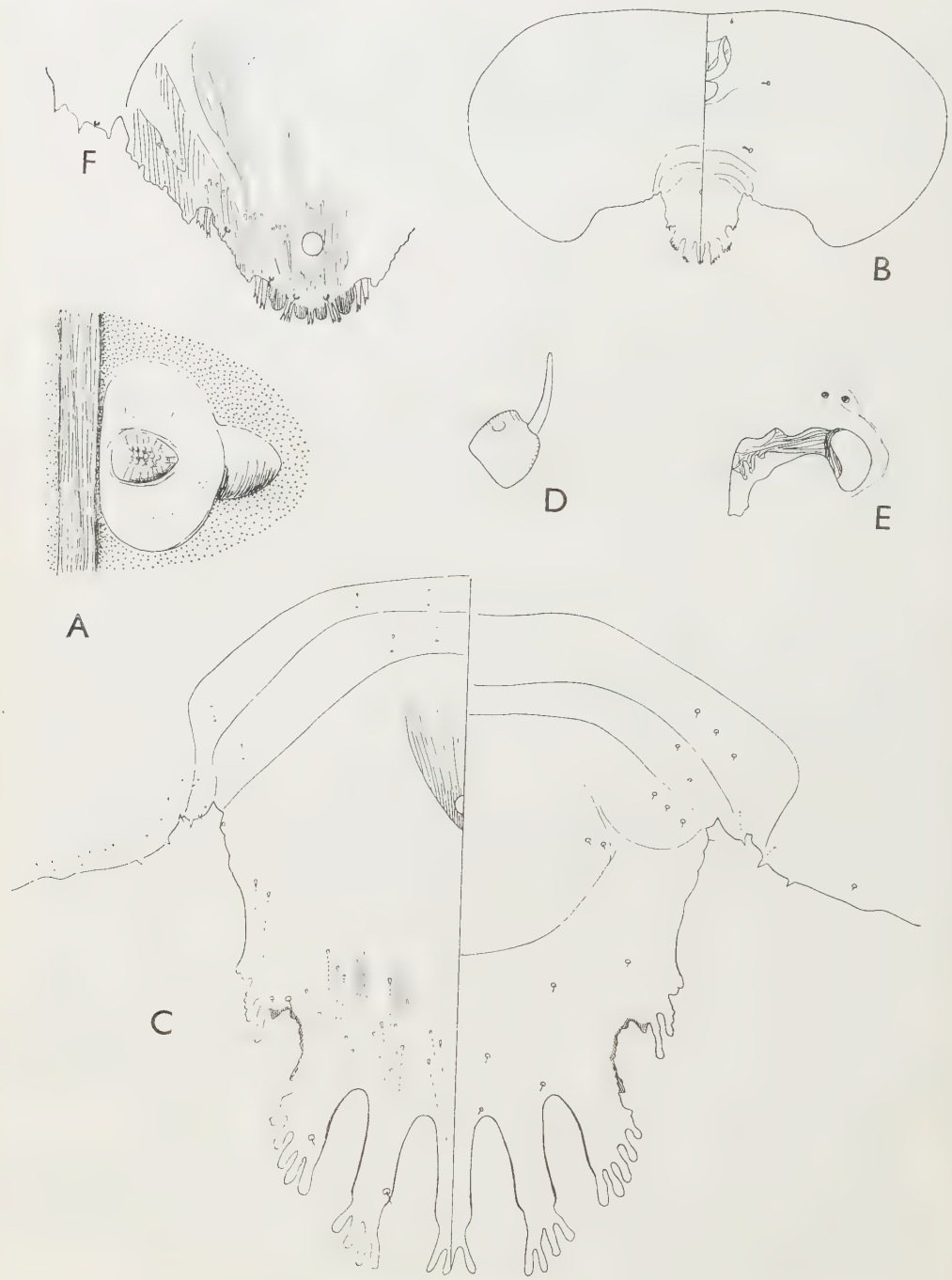


Fig. 1.—*Greeniella ramosa* sp. n.
A, scale of adult female; *B*, adult female, general aspect; *C*, pygidium; *D*, antenna; *E*, spiracle; *F*, pygidium of second stage female.

NOTES ON DERMAPTERA

By W. D. Hincks

(*Manchester Museum*)

IV. Descriptions of New Genera and Species*

Family Labiidae

Subfamily Spongiphorinae

Marava Burr, 1911

Marava Burr, 1911, *Dtsch. ent. Nat. Bibl.* **2**: 59, 60 (type *Labia grandis* Dubrony).
Prolabia Burr, 1911, *loc. cit.*: 60 (type *Forficula arachidis* Yersin).

In 1954 Boeseman (*Zool. Verh., Leiden* **21**: 83) established that the type species of *Prolabia* Burr, 1911, the cosmopolitan *P. arachidis* (Yersin), is merely a brachypterous form of *Marava wallacei* (Dohrn), the generotype of *Marava* Burr, 1911. In the third note in this series (1954) I pointed out that *Marava* has priority and that the cosmopolitan species should therefore be known as *Marava arachidis* (Yersin, 1860). Hebard (1917) felt obliged to transfer *Marava* from the Spongiphorinae to the Labiinae because of its close relationship, as he suspected, to *Prolabia*. It is very doubtful if the two subfamilies will be retained in the future but for the present I prefer to retain *Marava* Burr (= *Prolabia* Burr) in the Spongiphorinae because of its relatively large eyes and obvious relationship to *Spongovostox* Burr.

The problem now arises as to some of the other species associated with *Prolabia* by Burr, and regarding which Hebard (1917) wrote as follows: "It is with much regret that we are obliged to state that, though Burr has correctly separated *Prolabia* from *Labia*, his efforts in the *Genera Insectorum* to assign many American species to one of these two genera, have resulted in a very unsatisfactory state of affairs". The whole generic fabric of the Labiidae is most unsatisfactory and can only be reorganised fully during a revision of the World species, a task which I hope to be able to undertake at some future time. For the present it is necessary to refer to two species hitherto included in *Prolabia*, namely *P. unidentata* (Beauvois) and *P. pulchella* (Serville), specimens of which form part of a consignment of Dermaptera sent for identification by the American Museum of Natural History. In both species the male genital armature is so clearly dissimilar from that of *Marava arachidis* that it is quite impossible to associate them with that genus. In this respect also they differ from other Labiid genera which I have examined so that the following new genus is necessary for their reception.

Laprobia gen. n.[1]

Prolabia Burr (*partim*), 1911, *Dtsch. ent. Nat. Bibl.* **2**: 60.

Size rather small to medium. *Head* tumid; caudal margin sinuate; sutures obsolete. Eyes rather small, but variable in size, perhaps infraspecifically (see discussion under *L. unidentata*), usually shorter than genae but may be of almost equal length. Proximal antennal segment relatively short; third long, clearly longer than fourth and about same length as first; some segments weakly subpyriform (noticeably less so, especially the proximal segments, than in

* Notes I to III were published in these *Proceedings* in 1954 (**23**: 159–63).

[1] An anagram based on *Prolabia*.

Marava arachidis). *Pronotum* about as long as broad, expanded caudad. *Tegmina* and *wings* fully developed or latter aborted and former reduced and truncated caudad, ecarinate. *Abdomen* more or less parallel-sided to slightly expanded caudad in well developed males; glandular folds weak; ultimate tergite simple, often granulate in the female. *Pygidium* well developed in male, of usual Labiid type; almost hidden in female. *Forceps* of female usually with a short inner proximal lamella or series of denticulations. *Legs* rather stout; metatarsus approximately as long as second and third segments together. *Genitalia* with parameres long and slender, of approximately equal width throughout, rounded and not at all acuminate distad; virga rather short and simple, enclosed in a dense armature of inward directed teeth (when not everted).

Type species: *Forficula unidentata* Palisot de Beauvois, 1805.

I would place this genus in the Spongiphorinae, as at present understood, on account of the relatively large eyes and general facies. It differs from *Marava* in the noticeably less pyriform antennal segments and in the non-acuminate parameres. With Hebard's key (1917) it would run to *Spongovostox* Burr and *Microvostox* Hebard, both of which have acuminate parameres.

Besides the type species I would include *Prolabia pulchella* (Serville) and very probably also *P. dominicae* Rehn & Hebard, *P. jamaicana* Rehn & Hebard and *P. modesta* (Bruner).

Laprobia unidentata (Beauvois) (**comb. nov.**) (Fig. 1)

Forficula unidentata Palisot de Beauvois, 1805, *Ins. rec. Afr., Amer.*: 165, pl. 14, f. 3 (San Domingo).

Prolabia unidentata (Beauvois) Rehn and Hebard, 1917, *Bull. Amer. Mus. nat. Hist.* **37**: 647, pl. 62, fig. 5, 6, pl. 63, fig. 4 (Bahamas, Cuba, Hispaniola, Jamaica).

Bahamas, New Providence Isl.: Nassau, 5.iv.1953, 1 ♂ (*E. B. Hayden*) (Van Voast-A.M.N.H. Expd. Bahama Isls.). (In American Museum of Natural History). In addition to this male I have specimens in my own collection from Jamaica (1 ♂) and Cuba (2 ♂).

Boeseman (1954) has already pointed out that the eyes of *Marava arachidis* vary in size. I find that they are larger in the fully winged (the old *Marava wallacei*) and smaller in the brachypterous individuals (the old *Prolabia arachidis*). It might be thought that this correlation would re-establish *Marava wallacei* and *Prolabia arachidis* as distinct species, but it is interesting to note that there appears to be comparable variation in the North American and West Indian species previously referred to *Prolabia*. Reference to Rehn and Hebard (1917, pl. 62) show this distinctly in the figures of macropterous *P. unidentata* and brachypterous *P. pulchella*. Both species have macropterous and brachypterous phases and it would be interesting to compare the size of the eyes in both cases. Unfortunately I have very few specimens before me but two brachypterous *L. unidentata* from Cuba have distinctly smaller eyes, comparable with those of a brachypterous *L. pulchella* from Florida. A fully winged *L. unidentata* from Jamaica, on the other hand, clearly has larger eyes than the Cuban individuals of the same species.

Laprobia pulchella (Serville) (**comb. nov.**)

Forficula pulchella Serville, 1839, *Hist. Nat. Ins. Orth.*: 42 (New York).

Prolabia pulchella (Serville) Hebard, 1917, *Ent. News* **28**: 318, fig. 4, 319.

United States: Florida, Leesburg, Lake Co., 1 ♂, 1–11.iii.1954 (*M. Statham*); Alabama: Kushla, 2 ♀, 1–8.xi.1916; Pass Christian, Miss. Mch., 1 ♂ (without further data). (In American Museum of Natural History).

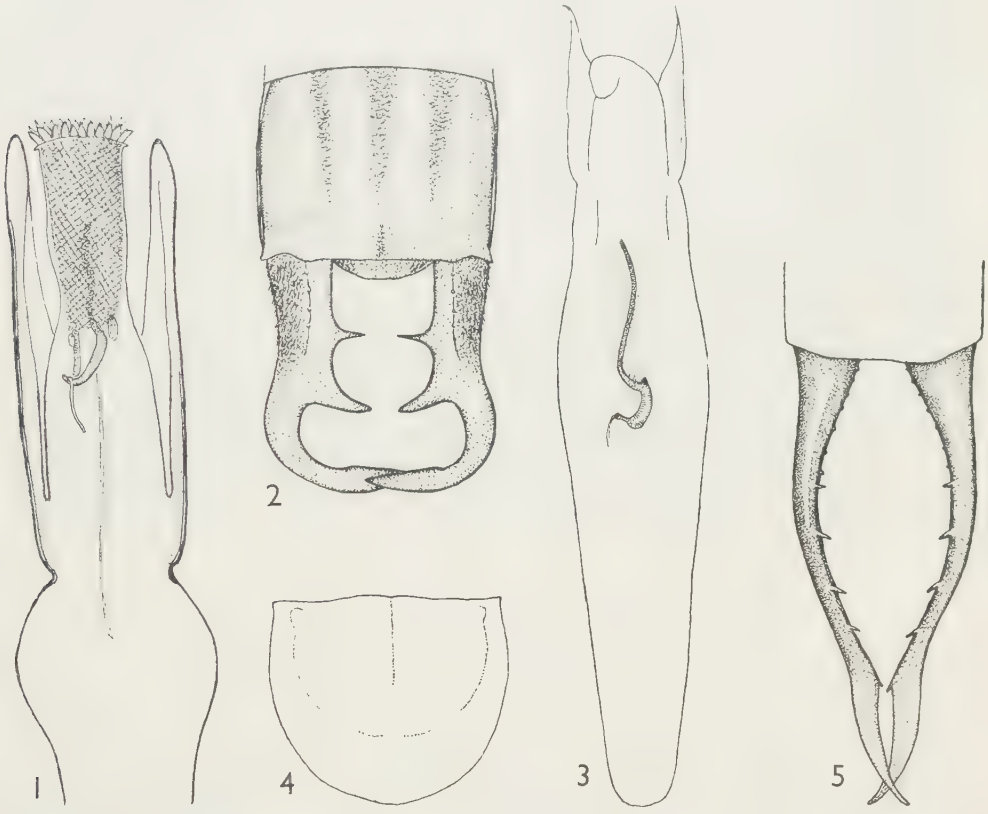
Of the two Kushla females one is macropterous and the other brachypterous, and both exhibit the same differences of eye size already noted under *L. unidentata*.

In addition to the above specimens I have before me a male taken alive in the Manchester docks, under the bark of oak from the U.S.A. The insect was captured by Mr. F. A. Hunter of the Ministry of Agriculture, Fisheries and Food, who also found Cerambycid larvae of the tribe Acanthocinini under the same bark. As far as I am aware this is the first occurrence of this species as an importation in Europe.

Subfamily Sparattinae

Auchenomus pandani sp. n. (Figs. 2, 3)

Male. Colour testaceous ; head, proximal antennal segment, proximal two-thirds of tegmina and whole of wing-scales, fuscous to piceous ; palpi, mouthparts and forceps fuscous. *Head*



Figs. 1–5.—(1) *Laprobia unidentata* (Palisot de Beauvois) : male genitalia ; contents of distal lobe partly everted. (2) *Auchenomus pandani* sp. n. : male tenth tergite and forceps. (3) *A. pandani* sp. n. : male genitalia. (4) *Afrocosmia denticulata* sp. n. : pronotum. (5) *A. denticulata* sp. n. : male forceps.

normal for the genus ; antennae with segments 3 to 8 (all remaining) long and slender. *Pronotum* normal for the genus. *Tegmina* and *wings* fully developed. *Abdomen* gradually expanded to eighth tergite ; upper surface to ninth tergite shining, micro-reticulate, but almost impunctate, with a few bristles especially at sides. Ultimate tergite (fig. 2) subquadrate ; sides strongly micro-reticulate ; disc with three longitudinal rugose bands ; caudal margin truncate mesad, sinuate laterad, very weakly tumescent above roots of forceps ; median longitudinal sulcus obsolete except near caudal margin. *Pygidium* transverse in dorsal view, declivent, asperate laterad ; caudal margin slightly concave, terminating laterad in an acute tubercle. *Forceps* (fig. 2) with outer sides basad strongly asperate and pubescent ; upper ridge distinct and crenulate to about one-third total length; distal half slightly to strongly arcuate ; inner margin with

two strong teeth, the distal one being the larger and directed slightly caudad. *Penultimate sternite* subquadrate; caudal margin truncate mesad, rounded laterad. *Genitalia* (fig. 3). *Length* 11 mm.

Female unknown.

Holotype ♂, New Guinea, Yalu: Lae, 1.1958 (*R. W. Paine*), on leaves of *Pandanus* (in Commonwealth Institute of Entomology); paratype ♂, same data, Hincks coll.).

The male genital armature (fig. 3) is very similar to that of the type species, *A. longiforceps* Karsch, from Madagascar, figured by the writer (Hincks, 1953, *Mém. Inst. Sci. Madag.* **E4**: 376, fig. 20). The present species is related to *A. angusticollis* (Dubrony) (1879, *Ann. Mus. Stor. nat. Genova* **14**: 359, Sarawak) but differs in the colour pattern of the pronotum and antennae and in the form of the forceps.

Certain discrepancies exist in the literature regarding *A. angusticollis* and *A. javanus* (Bormans) (1883, *Ann. Soc. ent. Belg.* **27**: 65, pl. 2, fig. 6, 6a, Java) which are difficult to reconcile. In 1912 Burr (*Ann. naturh. Hofmus. Wien* **26**: 91) stated that the type of *Platylabia javana* Bormans, in the Brunner collection (no. 11618), is a female and not a male as supposed by Bormans, and further that it is identical with *A. angusticollis*, also based on a female though supposed to be a male by its original author. Borelli (1921, *Boll. Mus. Zool. Anat. comp. Torino* **35** (736): 6) accepted the last statement, which indeed would appear to be correct judging from Dubrony's figure, and therefore described the male of *A. angusticollis* from a Bornean specimen. Although Borelli several times referred to both *A. angusticollis* and *A. javanus*, he never appears to have commented on Burr's statement regarding synonymy, always maintaining them as two distinct species. Burr's statement seems quite inexplicable since the original figures are quite unlike each other, especially if both names represent the same sex of the same species. I have a male determined as *A. javanus* by Borelli which agrees reasonably well with the original description of that species and with the figure which therefore would appear to represent the male sex. I would, therefore, maintain both species as distinct and assume Burr's statement to be the result of a *lapsus* of some kind.

Family Forficulidae

Subfamily Opisthocosmiinae

Afrocosmia gen. n.

Head moderately tumid; sutures obsolete. First antennal segment about one and a half times as long as greatest length of eye; segments 3 and 4 subequal in length and shorter than fifth. Eyes slightly longer than genae. Pronotum slightly transverse; sides slightly rounded; disto-lateral and caudal margins conjointly rounded. Tegmina and wings fully developed; former with well marked, almost complete, lateral carina. Abdomen gradually expanded to eighth tergite, thence slightly contracted to declivous, transverse tenth tergite; glandular folds of fourth tergite very large. Male forceps distant proximad, long slender, cylindrical. Pygidium hidden. Legs long and slender; posterior metatarsus clearly longer than second and third segments combined.

Type species: *Afrocosmia denticulata* sp. n.

This genus may be distinguished at once from other African genera of the subfamily by the distinct tegminal carinae. It closely resembles *Thalperus* Burr in general appearance but differs in the carinate tegmina and in the form of the male forceps. It is also related to *Emboros* Burr, from Madagascar and Burma, a genus regarding which there is still some confusion owing to its description (Burr, 1907, *Trans. ent. Soc. Lond.* **1907**: 103) from specimens from Diego Suarez, supposed to be congeneric, if not conspecific, with the type species *Opisthocosmia dubia* Bormans,

1894, which was described from a single female from Burma and was unknown to Burr except from description (*see* Hincks, 1953). *Afrocosmia* differs in having the pronotum slightly transverse and in having the sides and caudal margin conjointly rounded, in the proportionately shorter proximal antennal segments, the first being considerably less than twice as long as the greatest length of the eyes.

Afrocosmia denticulata sp. n. (Figs. 4, 5)

Male. Colour fulvous; two or three proximal antennal segments, mouthparts, sides of pronotum, shoulders, inner margins of wing-scales, caudal margin of ultimate tergite, legs in part, and tips of forceps, paler. *Head* broad, not contracted behind eyes; caudal angles rounded; caudal margin truncate; surface coriaceous. *Pronotum* (fig. 4) with prozona and metazona well differentiated; lateral margins elevated; cephalic angles rectangular. *Tegmina* broad, ample; caudal margin truncate; texture coriaceous as also are the wing-scales. *Abdomen* with a similar very fine coriaceous surface sculpture; lateral portions of tergites not produced, carinate or specially sculptured. Ultimate tergite depressed mesad near caudal margin, moderately tumid above roots of forceps; caudal margin more or less truncate mesad, weakly oblique laterad. *Forceps* (fig. 5) fairly broad proximad, pubescent, becoming narrower and slightly curved for proximal four-fifths of their length; at this point closely approximated, dentate, slightly thickened, thence tapering gradually to the slightly curved apices; upper inner margin of curved portion, mesad, with 4 or 5 rather strong denticles; lower margin proximad with slightly more numerous, smaller denticles. *Length* 13 mm.

Female unknown.

Unique ♂ type, Portuguese East Africa: Amatongas Forest, ii.1917 (*Rhodesia Museum*). (In British Museum (Nat. Hist.)).

I am indebted to Mr. J. A. Whellan for sending me this and other South African Dermaptera. I am also very grateful to Mr. E. C. Pinhey and to the authorities of the National Museum of Southern Rhodesia for allowing me to describe this species and to deposit its type in the British Museum collection on their behalf.

NEW OR LITTLE-KNOWN SPECIES OF EXOTIC TIPULIDAE (DIPTERA).—VIII

By Charles P. Alexander

(University of Massachusetts, Amherst, Massachusetts)

The preceding part in this series of papers was published in these *Proceedings* in 1950 (*Proc. R. ent. Soc. Lond.* (B) **19** : 85–89). In this part I am describing an interesting series of Pediciine crane-flies from the western Himalayas, in Kumaon, Uttar Pradesh, India, where they were collected by Dr. Fernand Schmid. I am very deeply indebted to Dr. Schmid for the time and care that he has devoted to the collecting and preparation of these fragile flies.

The species here considered belong to the genus *Dicranota* Zetterstedt, which is evidently highly developed throughout the Himalayan region and western China. Types of the new species are preserved in my personal collection.

Dicranota (Dicranota) strepens sp. n.

Size large (wing, male, over 10 mm.) ; general coloration light brown, praescutum with three darker stripes ; antennae 15-segmented, black throughout ; wings very pale yellow, restrictedly patterned with darker ; *Rs* weakly angulated before midlength ; male hypopygium with the interbase appearing as a broad plate that terminates in an acute spine, with a smaller tooth on the outer margin.

Male : length about 9 mm. ; wing 10·5 mm. ; antenna about 1·8 mm.

Rostrum and palpi black. Antennae 15-segmented, black throughout ; flagellar segments oval, the outer ones more elongate, longer than the verticils ; terminal segment much shorter than the penultimate. Head blackened, pruinose.

Pronotum light brown, variegated by darker. Mesonotum chiefly light brown, the praescutum with three darker stripes ; posterior sclerites more brownish-yellow, postnotum faintly patterned. Pleura medium brown, metapleura more yellowed. Halteres with stem whitened, knob slightly darker. Legs with coxae and trochanters yellowish-brown to light brown ; remainder of legs light brown, the outer tarsal segments blackened. Wings (fig. 1) very pale yellow, prearcular and costal fields slightly more saturated ; stigma pale brown ; a very narrow brown cloud over the anterior cord ; veins brown, *M* and most of 1*st A* very delicate, pale yellow. Abundant macrotrichia on longitudinal veins beyond cord, with fewer on *Rs* ; long series on outer ends of both anal veins. Venation : *Rs* weakly angulated before midlength ; R_{2+3+4} present, shorter than the basal section of R_5 ; *m–cu* just beyond one-third the length of M_{3+4}.

Abdomen brownish-black, hypopygium somewhat paler. Male hypopygium (fig. 6) of type broken, the various parts mounted on a microscope slide. Tergite produced, the surface with abundant delicate setae ; lateral tergal arms appearing as circular disks, each with an acute spine. Interbase (*i*) a broad plate that terminates in an acute spine, with a smaller tooth on outer margin before tip. Basistyle and dististyle (*b*, *d*) about as shown, terminating in an oval lobe that is provided with very long setae; pendant lobe of basistyle with abundant short spine-like setae. Aedeagus terminating in two obtusely rounded lobes

Holotype ♂, India : Badrinath, Pauri Garhwal, 11,000 ft., 18.vi.1958 (*F. Schmid*).

The most similar regional species is *D.* (*D.*) *longisector* Alexander, of the western Himalayas, readily distinguished by the smaller size, venation, as the long *Rs*, and especially in all details of structure of the male hypopygium.

Dicranota (Dicranota) garhwalensis sp. n.

Size medium (wing, female, 7 mm. or less) ; general coloration of mesonotum yellowish-grey, praescutal disk with three confluent darker brown stripes ; knobs of halteres weakly infuscated ; wings brownish-yellow, restrictedly but conspicuously patterned with darker brown ; vein R_2 slightly oblique.

Female : length about 5–5·5 mm. ; wing 6·5–7 mm.

Rostrum and palpi dark brown. Antennae brownish-black throughout ; basal flagellar segments short and crowded, the outer ones more elongate, exceeding their verticils. Head grey.

Pronotum brownish-grey. Mesonotal praescutum with the ground colour yellowish-grey, the disk with three confluent darker brown stripes, the scutal lobes similarly darkened ; median region of scutum and the posterior sclerites light brown. Thorax unusually short and deep. Pleura and pleurotergite testaceous brown. Halteres with stem yellowed, knob weakly infuscated. Legs with the coxae and trochanters obscure yellow ; remainder of legs light brown, the outer tarsal segments slightly darker. Wings (fig. 2) brownish-yellow, restrictedly but conspicuously patterned with darker brown, as follows : clouds beyond arculus in cells *Sc* to *M*, Sc_2, origin of *Rs*, cord, stigma, and over veins R_{1+2} and R_2 ; less evident markings at the outer medial forks and vaguely indicated at ends of veins M_1 to *2nd A* ; veins light brown, slightly darker in the patterned areas. Macrotrichia of veins of moderate length. Venation : *Sc* long, Sc_1 ending beyond the supernumerary crossvein ; *Rs* in the type weakly angulated and spurred beyond origin, in the paratype more nearly straight ; vein R_2 slightly oblique, much exceeding R_{1+2} ; veins M_1 and M_2 strongly divergent ; *m–cu* beyond fork of *M*, in transverse alignment with *r–m*.

Abdomen dark brown ; valves of ovipositor, including both cerci and hypovalvae, stout and bladelike, yellow.

Holotype ♀, India : Manghu Chatti, Pauri Garhwal, 9000–9270 ft., 21.v.1958 ; *paratype* ♀, Badrinath, Pauri Garhwal, 11,000 ft., 19.vi.1958 (*F. Schmid*).

D. (*D.*) *garhwalensis* is readily differentiated from all other regional members of the subgenus by the patterned wings.

Dicranota (Rhaphidolabina) reticularis sp. n.

Size medium (wing, 7–9 mm.) ; general coloration of praescutum brownish-yellow, with four conspicuous black stripes, the intermediate pair united behind ; halteres clear light yellow ; legs yellow, femora vaguely darkened just before tips ; wings whitish, with a conspicuous reticulated brown pattern ; vein R_2 oblique, cell 1*st* M_2 closed ; male hypopygium with tergal arms stout, dististyle single, terminal in position ; interbase a powerful rod that narrows gradually into a long spine.

Male : length about 5·5–6·5 mm. ; wing 7–7·8 mm. ; antenna about 0·9–1·0 mm.

Female : length about 5·5–7·5 mm. ; wing 7–9 mm.

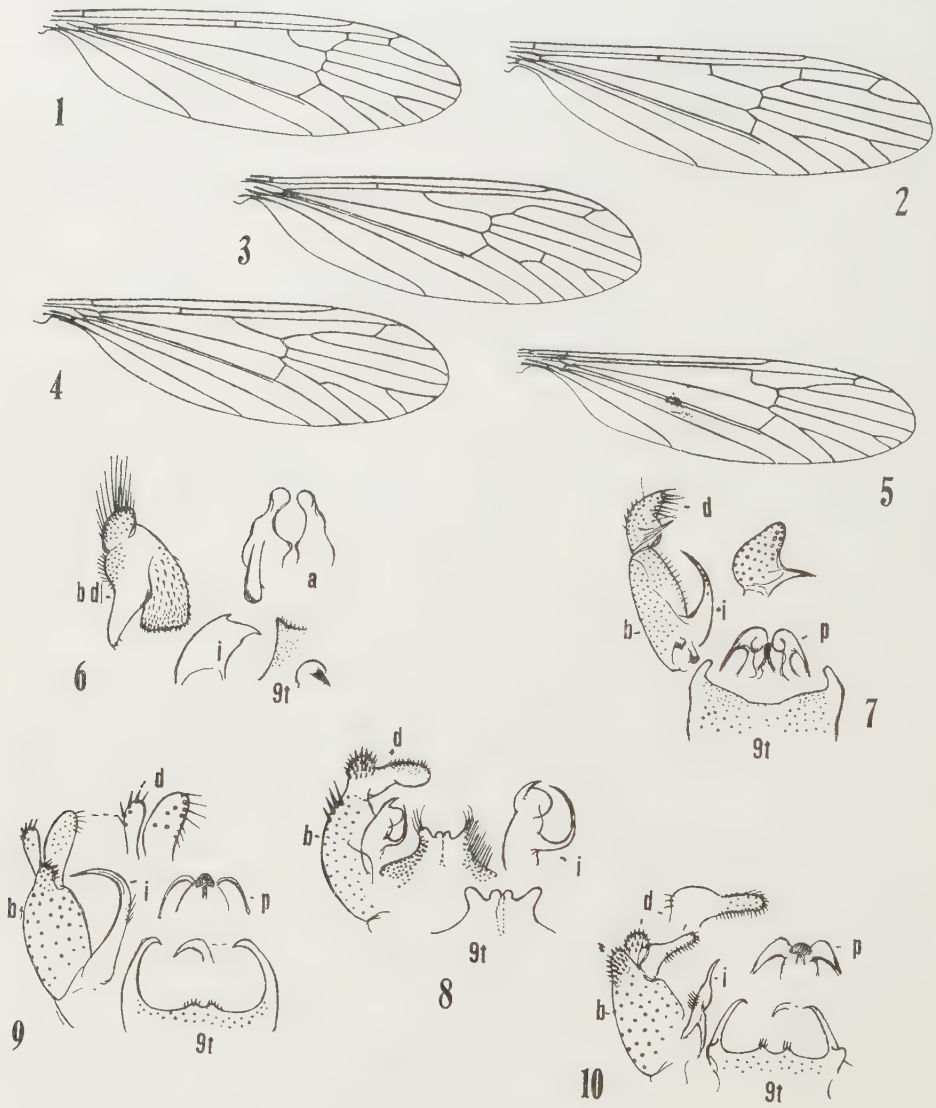
Rostrum and palpi black. Antennae short, 15-segmented, black throughout ; flagellar segments long-suboval, subequal to or longer than the verticils. Head brownish-grey.

Pronotum blackened, paler sublaterally. Mesonotal praescutum with the restricted ground yellow, with four conspicuous black stripes, the intermediate pair confluent behind, sublateral stripes narrow ; additional blackened spots at humeri and on lateral border ; posterior sclerites dark brown to brownish-black, parascutella and pleurotergite paler. Pleura brown, variegated with darker. Halteres clear light yellow. Legs with coxae brownish-black, fore pair more yellowed behind ; trochanters brown ; femora yellow, vaguely more darkened just before tips ; tibiae brownish-yellow ; tarsi pale brown, outer segments darker. Wings (fig. 3) whitish, with a conspicuous reticulated brown pattern, involving all cells, the areas narrowly transverse, in the posterior and anal cells becoming irregularly anastomosing ; somewhat larger areas at origin of *Rs*, stigma, cord, R_2 and fork of M_{1+2} ; veins brownish-yellow in the interspaces, darker in the patterned areas. Macrotrichia of veins relatively short and inconspicuous, occurring on most veins except near wing base. Venation : *Sc* long, Sc_1 ending about opposite midlength of R_{2+3} ; vein R_2 oblique, variable in length, in cases subequal to R_{1+2} ; cell 1*st* M_2 closed ; *m–cu* from about one-fourth to nearly its own length before the fork of *M* ; cell M_1 subequal to or longer than its petiole.

Abdomen, including hypopygium, dark brown. Ovipositor with the valves yellow, both the cerci and hypovalvae blade-like. Male hypopygium (fig. 7) with the tergite (*t*) large, transverse, posterior border shallowly emarginate, lateral arms stout, with obtuse tips. Basistyle (*b*) relatively slender ; interbase a very powerful simple structure that narrows very gradually into a long spine, on outer half with about six or seven large punctures that bear small setae. Dististyle (*d*) single, terminal in position ; main body with numerous setae, those of the inner face very long and stout, at base with a strong spine.

Holotype ♂, India: Manghu Chatti, Pauri Garhwal, 9000–9270 ft., 21.v.1958; *allotype* ♀, Dhur, Almora, 7400 ft., 8.ix.1958 (*F. Schmid*). *Paratypes*, 9 ♀♀, with the allotype; ♂, Gaurikund, Pauri Garhwal, 6400–7200 ft., 10.v.1958; Saran, Almora, 7,200 ft., 17.ix.1958 (*F. Schmid*).

Dicranota (*Rhaphidolabina*) *reticularis* is entirely different from all known species of the genus in the extreme development of reticulation in the wing pattern. In this latter regard it suggests the condition found in *Trichocera reticulata* Alexander, of the Himalayas and western China.



Figs. 1–10.—(1–5) Venation of: (1) *Dicranota* (*Dicranota*) *strepens* sp. n.; (2) *D.* (*D.*) *garhwalensis* sp. n.; (3) *D.* (*Rhaphidolabina*) *reticularis* sp. n.; (4) *D.* (*R.*) *trichoneura* sp. n.; (5) *D.* (*Rhaphidolabis*) *brachyneura* sp. n. (6–10) Male hypopygium of: (6) *D.* (*D.*) *strepens* sp. n.; (7) *D.* (*Rhaphidolabina*) *reticularis* sp. n.; (8) *D.* (*R.*) *trichoneura* sp. n.; (9) *D.* (*Rhaphidolabis*) *brachyneura* sp. n.; (10) *D.* (*R.*) *khumyaræ* sp. n. (*a*, aedeagus; *b*, basistyle; *d*, dististyle; *i*, interbase; *p*, phallosome; *t*, tergite.)

Dicranota (Rhaphidolabina) trichoneura sp. n.

Size medium (wing about 6 mm.); antennae 16-segmented; general coloration of praescutum reddish-brown, with three darker brown stripes; wings subhyaline, unpatterned, veins with long conspicuous trichia; cell M_2 open or closed; male hypopygium with the posterior border of tergite terminating in four lobes, the lateral margins fringed with long yellow setae; a single dististyle that is chiefly fused with the apex of the basistyle.

Male: length about 5–5·2 mm.; wing 6–6·2 mm.; antenna about 0·8–0·9 mm.

Female: length about 5·5 mm.; wing 6·5–6·7 mm.; antenna about 1·0 mm.

Rostrum and palpi light brown, mouthparts yellow. Antennae short, 16-segmented; scape and pedicel brownish-yellow, flagellum brown; basal flagellar segments short and crowded, especially in the male, all with numerous verticils that are subequal in length to the segments. Head brownish-grey behind, paler in front.

Pronotum brown, paler laterally, with long erect pale setae. Mesonotal praescutum reddish-brown with three darker brown stripes, the sides paler; posterior sclerites of notum brown; thorax unusually deep and gibbous. Pleura and pleurotergite obscure yellow, the sternites a little darker. Halteres with stem yellow, darker outwardly, knob brown. Legs with coxae and trochanters yellow; remainder of legs light brown. Wings (fig. 4) subhyaline, stigma barely indicated; veins brown, with long conspicuous trichia. Venation: *Sc* long, Sc_1 ending about opposite one-third the length of R_{2+3}; *Rs* relatively long, R_{2+3+4} from about two-thirds to three-fourths the length of *Rs*; vein R_2 strongly oblique, subequal to R_{1+2}; cell M_2 open (in type), in cases closed, in which cases cell M_1 is subequal in length to its petiole; *m–cu* about one-half its length beyond the fork of *M*.

Abdomen, including hypopygium, dark brown, clothed with long pale setae. Ovipositor with cerci yellow, compressed-flattened. Male hypopygium (fig. 8) with the tergite (*t*) transverse at base, narrowed posteriorly, terminating in four unequal lobes; posterior border and outer lobes fringed with abundant very long stout yellow setae, intermediate lobes small, with short inconspicuous setae. Basistyle (*b*) small, the interbase (*i*) very large and conspicuous, appearing as a flattened blade, on its mesal margin bearing a very long curved spine, margin of outer blade with a much smaller spine; outer surface of basistyle with numerous setae, the outermost very stout, black. Dististyle (*d*) single, merging with the basistyle, consisting of a small oval outer lobe beset with numerous black spinoid setae and a larger oval beak, its tip obtuse, surface with very abundant paler and more slender setae.

Holotype ♂, INDIA: Tungnath, Pauri Garhwal, 9000 ft., 1.vi.1958; *allotype* ♀, Tarsali, Pauri Garhwal, 6000–7000 ft., 6.v.1958 (*F. Schmid*). *Paratopotypes*, 2 ♂♂, with the type; *paratype*, 1 ♀, mounted with the allotype.

I am referring the present fly to the subgenus *Rhaphidolabina* Alexander rather than to *Rhaphidolabis* Osten Sacken, chiefly on the basis of cell 1*st* M_2 being closed in certain specimens. The fly is entirely distinct from all other regional members of the genus in the structure of the male hypopygium and in the long conspicuous trichia of the wing veins.

Dicranota (Rhaphidolabis) brachyneura sp. n.

General coloration of thorax dark brown; antennae black, 13-segmented; knobs of halteres infuscated; legs brownish-black; wings weakly infuscated, stigma darker; *Sc* unusually short, Sc_1 ending opposite or shortly beyond the origin of *Rs*; male hypopygium with the posterior border of tergite bearing two small submedian lobes, lateral arms stout, narrowed to subcultrate tips; interbase a long yellow blade that narrows to an acute tip; two dististyles, the larger inner one suboval.

Male: length about 4–4·3 mm.; wing 4·5–5 mm.; antenna about 0·7–0·75 mm.

Female: length about 5 mm.; wing 5 mm.

Rostrum and palpi black. Antennae short, black, 13-segmented; flagellar segments long-oval, exceeding the verticils. Head dark brown.

Pronotum dark brown. Mesonotum almost uniformly dark brown, lateral praescutal borders and central region of scutum paler. Pleura dark brown, vaguely patterned with paler. Halteres with stem pale, knob infuscated. Legs with coxae and trochanters testaceous yellow; remainder of legs brownish-black. Wings (fig. 5) weakly infuscated, stigma darker brown; veins dark brown. Venation: *Sc* unusually short, Sc_1 ending opposite origin of *Rs* or slightly beyond, the

latter short, strongly arcuated to weakly angulated; R_{2+3+4} long, subequal to *m–cu*; cell M_1 small to very small; *m–cu* more than one-half its length beyond the fork of *M*.

Abdomen, including hypopygium, dark brown. Male hypopygium (fig. 9) with the tergite (*t*) transverse, posterior border subtruncate, with two very small submedian lobules; lateral arms conspicuous, appearing as pale flattened blades that narrow to subcultrate tips. Basistyle (*b*) at apex produced into a low lobe set with numerous black spinoid setae. Interbase a long yellow blade, curved and narrowed to the acute tip. Two dististyles (*d*), the outer style longer than the lobe of the basistyle, slightly expanded distally, the apical margin with a few spinoid setae; inner style longer and broader, suboval, with long pale setae.

Holotype ♂, India: Jakhanr, Teri Garhwal, 3500 ft., 24.iv.1958; *allotype* ♀, Agra, Teri Garhwal, 3000–5000 ft., 5.iv.1958 (*F. Schmid*). *Paratopotypes*, 2 ♂♂, with the type; *paratypes*, 1 ♀, with the allotype, 6.iv.1958; 1 ♂, Salkhola, Pauri Garhwal, 4240 ft., 22.viii.1958; 1 ♀, Simra, Pauri Garhwal, 5800 ft., 2.x.1958; 1 ♂, Loharket, Almora, 5770 ft., 14.ix.1958 (all *F. Schmid*).

D. (*R.*) *brachyneura* is readily distinguished from all other described regional members of the subgenus, with the exception of the species next described, by the unusually short *Sc*, and by the structure of the male hypopygium, particularly the tergite, interbase and inner dististyle. Throughout the entire tribe Pediciini it is very difficult to state whether the lobes or appendages at the end of the basistyle actually are dististyles or are apical lobes of the basistyle itself. This condition has been discussed in various papers by the writer and by Edwards.[1]

Dicranota (Rhaphidolabis) khumyaræ, sp. n.

Allied to *brachyneura*; general coloration of head and thorax grey, the praescutum with three blackened stripes; antennae 13-segmented; knobs of halteres dark brown; legs brownish-black; wings subhyaline, stigma pale brown; *Sc* short; male hypopygium with the lateral tergal arms slender, narrowed to curved acute points; interbase dilated on basal part, narrowed outwardly; inner dististyle with the beak long-produced.

Male: length about 4·5–4·6 mm.; wing 5–5·3 mm.; antenna about 0·7–0·8 mm.

Rostrum and palpi black. Antennae black, 13-segmented; flagellar segments long-oval, exceeding the verticils. Head brownish-grey.

Pronotum brownish-grey. Mesonotal praescutum grey, with three blackened stripes; remainder of notum grey, the scutal lobes brownish-black. Pleura light grey. Halteres with stem obscure yellow, knob dark brown. Legs with the coxae brownish testaceous to light brown; trochanters yellow; remainder of legs brownish-black. Wings subhyaline, extreme base yellowed, stigma pale brown; veins dark brown. Venation: *Sc* very short, Sc_1 ending just beyond the origin of *Rs*, Sc_2 at near mid-distance beween level of arculus and origin of *Rs*; R_{2+3+4} longer than *m–cu*; cell M_1 relatively deep; *m–cu* more than one-half its length beyond the fork of *M*.

Abdomen dark brown, hypopygium paler brown. Male hypopygium (fig. 10) generally as in *brachyneura*, but differing in all details. Tergite (*t*) with the posterior border subtruncate, with two small submedian tubercles that are tufted with long setae; lateral tergal arms thickened at base, the blade-like outer part narrowed very gradually to an acute gently curved point. Outer apical lobe of basistyle with numerous spinoid setae. Interbase dilated on basal part, narrowed outwardly, on outer margin of the expanded part with several erect setae. Outer dististyle (*d*) oval, with numerous spinoid setae; inner style expanded basally, the beak long-produced. Phallosome (*p*) with lateral arms relatively short and stout.

Holotype ♂, India: Khumyara, Pauri Garhwal, 4300–5000 ft., 4.v.1958 (*F. Schmid*). *Paratopotypes*, 3 ♂♂, 4–25.v.1958.

Although it is evidently closely allied to *D.* (*R.*) *brachyneura* sp. n., the present fly is quite distinct in the body coloration and, especially, in the structure of the male hypopygium, including the tergite, interbase and dististyles.

[1] Edwards, F. W., 1938, British short-palped craneflies. Taxonomy of adults. *Trans. Soc. Brit. Ent.* 5: 1–168, 5 pls., 31 figs, (reference p. 52).

STUDIES ON AUSTRALIAN CARABIDAE (COLEOPTERA)—1. NEW SPECIES OF THE TRIBES *AGONICINI*, *TRECHINI* AND *PTEROSTICHINI*

By B. P. Moore

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The Australian Carabidae so far described already total over sixteen hundred species, distributed between some two hundred genera, and many more undoubtedly await discovery. A sound basis for the study of this large group has been set by the late T. G. Sloane, whose researches appeared in fifty important papers, published over the period 1888–1923 [*see* Musgrave (1932) for complete list]. However, Sloane was handicapped in his attempts to identify the species described by earlier authors (Bates, Castelnau, Chaudoir and others) because the types were not available to him, and, since he seldom provided illustrations in his papers, some of his own work is difficult to follow. Unfortunately, too, his collection suffered badly before finding its present resting-place at Canberra. Since his death, in 1932, there has been little activity in this field.

The present paper is the first of a projected series in which I expect to describe and figure some of the more important Australian forms. To begin with, I shall be content, for the most part, to deal with new species that are on hand, particularly those of which adequate material is already available. Later, as the work progresses, more attention will be given to revisional studies.

Agonicini

This tribe was erected by Sloane (1920) for the reception of his new genus *Agonica*, with two species from Tasmania. It is now known that a further species of the tribe exists in the southeastern mountain ranges of mainland Australia. This species requires a new genus :

Pseudagonica gen. n.

With the systematic characters of the tribe.

Head small, rather broad, depressed ; eyes moderately prominent, not enclosed behind ; frontal sulci obsolescent ; *labrum* emarginate, 4-setose ; *mentum* with a prominent median tooth ; *labial palpi* with penultimate joint slender, bisetose on inner margin, terminal joint widely securiform, setulose over entire surface ; *maxillary palpi* long, slender, with two apical joints setulose ; mandibles slender, widely separated at base ; antennae arising under apex of marginal ridge, basal condyle visible from above, basal joint long, scapiform, second and third joints shorter than fourth.

Pronotum transverse, rather depressed, narrowly margined on sides ; anterior and posterior marginal setae present ; basal impressions feeble.

Hind-body shortly pedunculate, apterous ; scutellum on peduncle, not well-marked ; *elytra* broadly ovate, depressed, soldered together along suture, impunctate on disc, apical sinuosities and marginal umbilical punctures well-marked.

Legs of moderate length ; middle and posterior tibiae sulcate on inner side ; tarsi slender, upper surface setulose.

Generic type species, *Pseudagonica nitida* sp. n.

This new genus is closely related to *Agonica* Sloane, but it may be distinguished according to the following key :

Form depressed. Head small, transverse ; frontal sulci obsolescent. Elytra broad, with apical sinuosities strongly marked. Middle and posterior tibiae with inner side sulcate . . . . . **Pseudagonica** gen. n.

Form rather convex. Head larger, elongate, somewhat rostrate ; frontal sulci deep. Elytra elongate-oval, with apical sinuosities less marked. Middle and posterior tibiae with inner side smooth . . . . **Agonica** Sloane

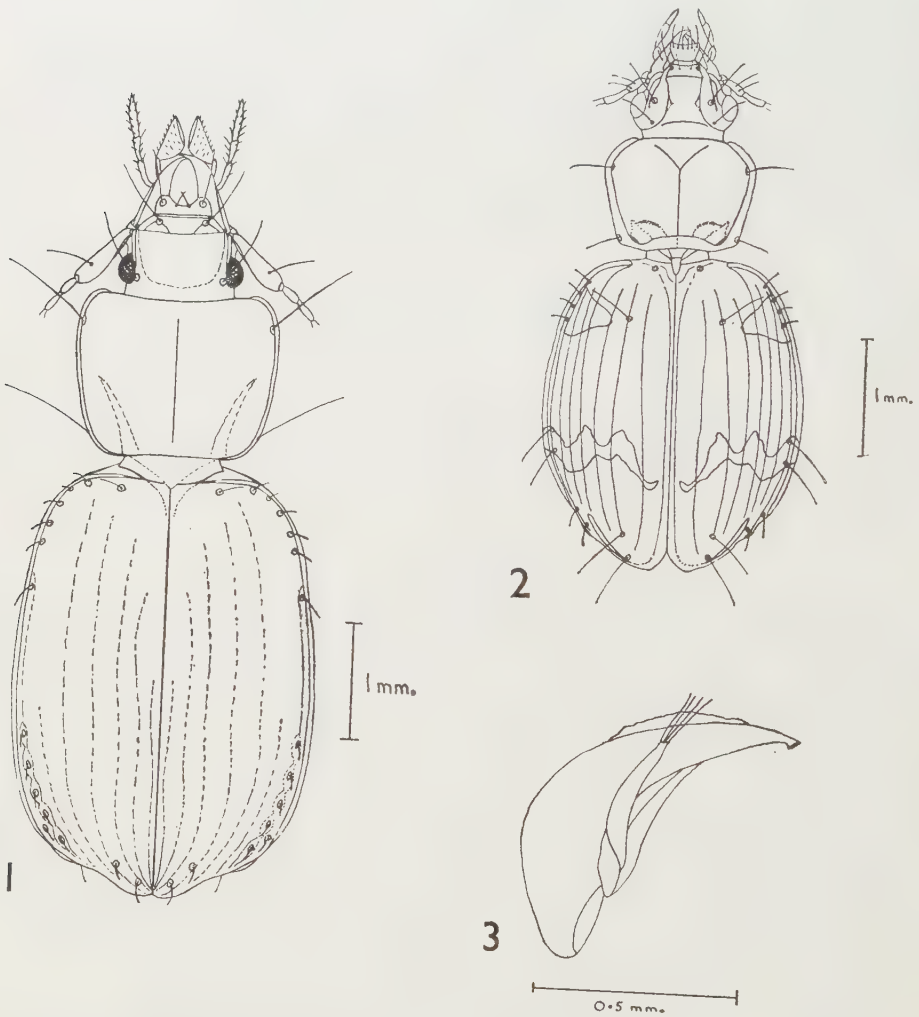
Pseudagonica nitida sp. n. (Fig. 1)

Female : Form depressed. Upper and under surface shining black ; legs, antennae and mouthparts (including mandibles and labrum) testaceous.

Head small, with small but rather prominent eyes. Pronotum varying from slightly to moderately transverse ; apex a little wider than base ; sides narrowly margined, lightly rounded on front third, then gently and obliquely contracted to base ; anterior angles rounded but rather prominent, posterior angles rounded and obtuse ; anterior marginal seta placed inside the border, the posterior seta situated on the border a little before the basal angles ; basal impressions long, outcurved, feebly impressed ; median line well-marked. Elytra broad, smooth, very lightly striate ; marginal umbilical punctures more or less interrupted in middle.

Length 4–6 mm. ; max. width 1·6–2·3 mm.

Male : unknown.



Figs. 1-3.—(1) *Pseudagonica nitida* gen. et sp. n. ; (2) *Sloanella otwayensis* sp. n. ; (3) the same, aedeagus in left lateral view.

Type : female and paratype, Victoria : Beech Forest, 11–19.i.32 (*F. E. Wilson*), in Mr. Wilson's collection. Two paratypes, Otway Ranges, iv.57 (*P. J. Darlington*), in the Museum of Comparative Zoology, Harvard (U.S.A.). Paratype, near Lorne, 2.i.59 (*B. P. Moore*), in my collection.

The above type material was collected from various stations in the Otway Ranges, but I have seen two further specimens (females, one taken by Mr. Wilson, the other by Dr. Darlington) from the mountains to the eastward of Melbourne. These two specimens are smaller (length 3–3·5 mm.) and proportionately narrower than the types, with the elytral striae scarcely traceable. They may represent a distinct subspecies (or even species) but their status must remain uncertain until the males of both forms are known.

Trechini

Sloanella otwayensis sp. n. (Figs. 2–3)

Form ovoid, rather convex. Upperside mostly piceous, femora, palpi, basal joint of antennae and elytral fasciae testaceous ; tibiae, tarsi, borders of pronotum and underside intermediate in colour.

Head rather small, triangular ; eyes well-developed. Pronotum rather variable in proportions, slightly to moderately transverse, widest before middle (at the site of the anterior marginal seta), strongly contracted towards apex, less so towards base ; posterior marginal seta situated a little before the basal angles, which are obtuse but well-marked ; marginal channel wide and reflexed towards base ; basal margin slightly obliquely truncate ; basal impressions large, deep. Elytra oval, strongly convex, shining, each with a broad, triangular posthumeral fascia extending from the margin to the fourth stria, and an undulate post-median fascia extending from the margin almost to the suture ; striae well-marked, the first extending round the apex towards the sixth, the third bearing a basal and an apical seta. Legs slender, femora pale, tibiae and tarsi darker ; anterior tarsi in male with two basal joints feebly dilatate. Median lobe of aedeagus (fig. 3) strongly curved and tapered, resembling, in outline, an elephant's trunk.

Length 4·3–4·6 mm. ; max. width 1·8–2·0 mm.

Type and paratype, Victoria : Beech Forest, 11–19.i.32 (*F. E. Wilson*), in Mr. Wilson's collection. Four paratypes, near Lorne, 25.i.59 (*B. P. Moore*), at present in my collection.

This species resembles *S. coxi* Sloane in form and pattern but *coxi* has a broader pronotum and the elytral striae (except the first) are obsolescent.

Pterostichini

Notonomus hamifer sp. n. (Figs. 4–5)

Form robust, subparallel. Upper surface dull bronze or cupreous, underside and appendages black.

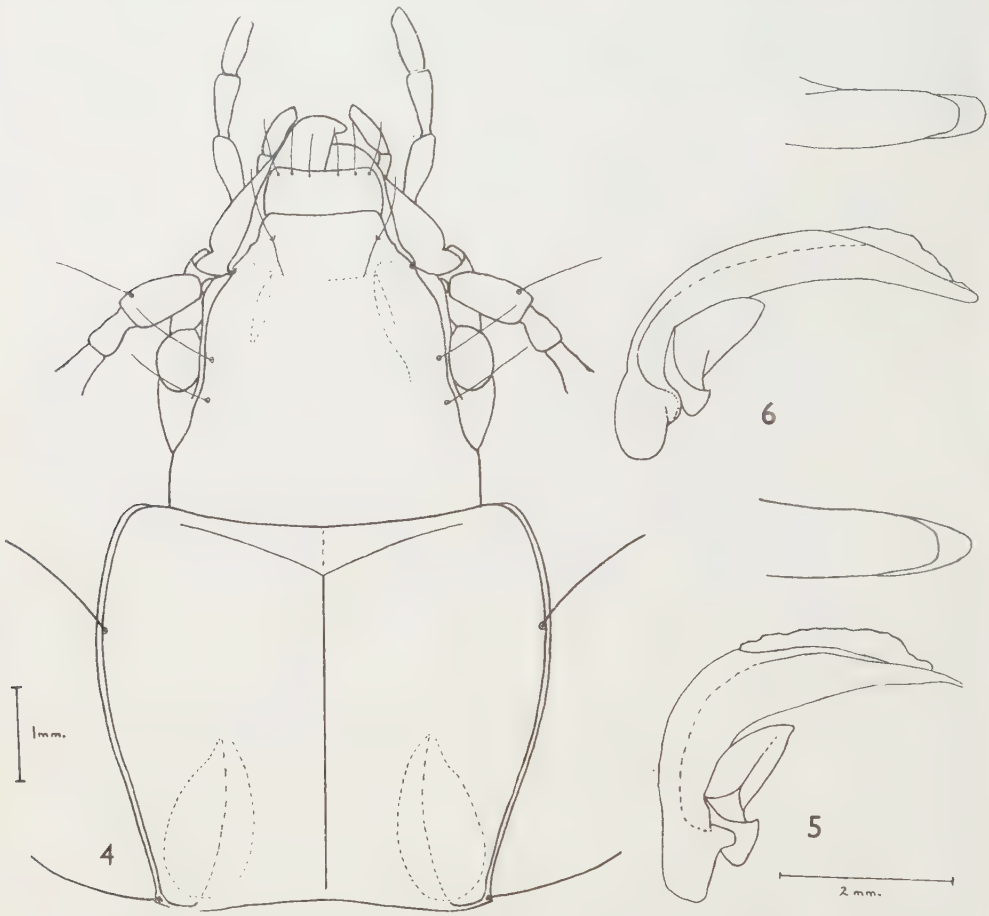
Head large (especially in males), smooth ; frontal impressions feeble ; eyes small, not prominent, enclosed behind in large, swollen orbits ; mandibles short, stout, abruptly hook-tipped. Pronotum slightly transverse, cordate, broadest before middle, a little wider at apex than base ; sides narrowly margined, lightly rounded on front half, contracted and slightly sinuate towards base ; basal angles obtuse but well-marked ; anterior margin slightly excavate, posterior margin undulate ; posterior marginal seta situated on border at basal angle ; median line and basal impressions well-marked ; intercoxal process of prosternum rounded in middle. Elytra elongate, subparallel, a little wider than pronotum ; apical curve lightly sinuate on each side ; humeral angles not dentate ; striae strongly impressed, simple ; interstices convex in male, flat in female, the third bearing 3–5 setae (usually 4). Apex of abdomen sexsetose in female, bisetose in male. Legs short, robust ; anterior tarsi with three basal joints dilatate in male, simple in female ; onychium glabrous beneath. Aedeagus (fig. 5) robust ; median lobe without an apical disc.

Length 17–20 mm. ; max. width 5·6–6·5 mm.

Type male, Victoria : Mt. Baw Baw, 29.xii.58 (*B. P. Moore*), in the National Museum, Melbourne. *Paratypes*, 16 examples (both sexes), data as for type, at present in my collection.

This very distinct species occurred under logs from about the 4,300 ft. level to the summit of the mountain (5127 ft.). It would key out to the " *violaceus* group " of Sloane's (1913) revision, but the general facies, the presence of six apical setae on

the female abdomen and the form of the aedeagus suggest affinity with the "*eques* group". The characters of the head, particularly the hook-tipped mandibles, separate it from related species.



FIGS. 4–6.—(4) *Notonomus hamifer* sp. n., foreparts. (5–6) Aedeagi of *Notonomus* spp. in dorsal and left lateral views (all to same scale): (5) *N. hamifer* sp. n.; (6) *N. aequabilis* sp. n.

Notonomus aequabilis sp. n. (Fig. 6)

Form short and rather convex. Black; pronotum and elytra with slight metallic reflections.

Head of medium size, smooth; frontal impressions short and shallow; eyes small, rather prominent; postocular orbits not marked; mandibles short. Pronotum slightly to moderately transverse, broadest at or a little before middle, about as wide at apex as at base; sides narrowly margined and regularly rounded, or nearly so, from apex to base; anterior angles acute but not prominent, posterior angles rounded and obtuse; anterior and posterior margins almost straight; median line well-marked; basal impressions short and deep; posterior marginal seta on border at basal angle; intercoxal process of prosternum rounded in middle. Elytra wider than pronotum, lightly rounded on sides, feebly sinuate towards apex; humeral angles rounded; striae well-impressed, simple; interstices flat, the third bearing 3–5 setae close to the third stria. Apex of abdomen 4-setose in female, bisetose in male. Legs rather short; anterior tarsi with three basal joints dilatate in male, simple in female; onychium setulose beneath. Aedeagus (fig. 6) characteristic, the median lobe long and slender, without a prominent apical disc.

Length 17–19·5 mm.; max. width 5·8–6·5 mm.

Type: male and two paratypes, VICTORIA: Tambo Crossing, i.35 (*F. E. Wilson*), in Mr. Wilson's collection. Three paratypes (same data) in my collection.

This species also belongs to Sloane's "*violaceus* group", but all other members of that group, except *rainbowi* Sloane, have the onychium glabrous beneath. *N. rainbowi* is a much larger insect (length about 25 mm.) and the aedeagus carries a prominent, barb-like apical disc.

Acknowledgments

I am greatly indebted to Dr. P. J. Darlington (Harvard College), to Mr. F. E. Wilson (Melbourne) and to the authorities of the National Museum of Victoria for the opportunity to study much of the interesting material dealt with in this paper.

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AËDES SUBGENUS *ALANSTONEA* SUBGEN. NOV. (DIPTERA : CULICIDAE)

By P. F. Mattingly

(*British Museum (Natural History)*)

The two species, *Aëdes treubi* (De Meijere) and *Aëdes brevitibia* (Edwards), included in this subgenus were placed by Edwards (1922, 1932) in the genus *Armigeres*. Brug (1931) and Bonne-Wepster & Brug (1932) preferred to place *treubi* in subgenus *Stegomyia* of *Aëdes* but Brug (1934) later agreed to follow Edwards to avoid confusion. Nevertheless Brug & Bonne-Wepster (1947) placed both species in *Stegomyia* and they have been followed by Stone *et al.* (1959). In a previous paper (Mattingly, 1954) I stressed some of the formidable difficulties attendant on placing these species in *Stegomyia* and suggested their retention in *Armigeres* pending further study. In the course of a revision of the Indomalayan Culicini (Mattingly, 1957 *etc.*) a point has been reached at which it is necessary to come to a decision. After careful study I am satisfied that the decision to transfer these species to *Aëdes* is correct but their inclusion in *Stegomyia* is so grossly inconvenient that I feel compelled to propose the present new subgenus for them.

Aëdes subgenus **Alanstonea** subgen. nov.

Type species : *Scutomyia treubi* De Meijere (1910 : 918).

The following brief diagnosis will be amplified in the course of the revision of the Indomalayan Culicini referred to above.

Adult ♀ : proboscis short, stout, laterally compressed with marked downward curvature; palps slightly less than a quarter of the length of the proboscis ; pleura with hypostigmal scale patch and with upper and lower sternopleural scale patches almost or quite confluent ; mesepimeral scale patch extending well up among the upper mesepimeral bristles ; paratergite with numerous scales ; postspiracular area with few or no scales ; spiracular and lower mesepimeral bristles absent ; postspiracular bristles present.

Adult ♂ : proboscis and pleura as described for female ; palps slender, nearly bare, longer than proboscis with terminal segment at least as slender as the subterminal ; terminalia very much as in *Aëdes* subgenus *Stegomyia*.

Pupa : paddles very small, shorter than seta 7 on segment VIII, subtriangular with well developed apical seta and edges almost smooth ; seta 1 on segment I reduced to 2–3 main branches with some secondary branching or feathering ; seta 7 on segments I–V small and inconspicuous.

Larva : siphon with a single pair of unbranched subventral setae arising near apex ; pecten with 6–17 teeth ; upper and lower caudal setae both single ; ventral brush without barred area, with 8–9 setae all or most of which are unbranched. (Thurman, 1959, says that in the Thailand species attributed to *treubi* the ventral brush has only 2 setae. I cannot confirm this as I have not seen specimens.)

Breeding places.—*Nepenthes* pitchers.

Distribution.—Thailand, Java, Borneo.

Included species.—*Aëdes treubi* De Meijere, *Aëdes brevitibia* Edwards.

Diagnosis. The curved proboscis easily distinguishes adults of both sexes from all other *Aëdes*. They are distinguished from *Tripteroides* by the absence of spiracular bristles and from *Armigeres* by the combined presence of postspiracular bristles and absence of lower mesepimerals. Most *Armigeres* also have longer female palps. Males of both *Tripteroides* and *Armigeres* are readily distinguished by the terminalia as well as by the pleural chaetotaxy. The pupa is distinguished from *Tripteroides* by the well developed apical paddle seta and from *Aëdes* and *Armigeres* by the size and shape of the paddles. *Uranotaenia ascidiicola* De Meijere and *U. nepenthes* Theobald, which also breed in plant pitchers, have small paddles with apical setae but the shape of these is quite different and there are more numerous branches in

the float hair (seta 1) on segment I. The larva is distinguished from that of *Armigeres* by the presence of a pecten, from *Tripteroides* by the single pair of subventral setae on the siphon and from *Aëdes* by the combination of single upper caudal seta and ventral brush without barred area. Larvae of the purely African genus *Eretmapodites* are similar but have, usually, fewer pecten teeth or, if not, fewer setae in the ventral brush (though see above with reference to the Thailand species).

Affinities.—These are very interesting. The scutal ornamentation of *Aë. treubi* is very reminiscent of certain East African highland bamboo-breeding *Stegomyia* (*Aë. angustus* Edwards, *bambusae* Edwards). That of *Aë. brevitibia* strongly recalls *Armigeres*. The pleural scaling, though extensive, is less so than in *Armigeres* or in the African subgenus *Pseudarmigeres* of *Aëdes*, which also breeds in bamboos and resembles *Armigeres* in the male terminalia and in scutal ornamentation. Certain *Tripteroides*, especially the Indian and Indomalayan *T. aranoides* Theobald, share with *Armigeres* not only the scutal and pleural ornamentation but also the down-turned proboscis. In *T. aranoides* also, very interestingly, the ninth tergite of the male has a narrow process with spines very similar to those found on the style of *Armigeres* and *Pseudarmigeres*. It seems that in the evolution of these groups there has been a transfer from one part of the hypopygium to another. A similar transfer has been noted in other cases (Mattingly, 1958 : 42 ; Mattingly & Marks, 1955 : 172). In general features the pupa of the present subgenus recalls *Tripteroides*. The great reduction in the ventral brush of the Thailand species, if confirmed, would further emphasise this relationship.

Acknowledgment

This subgenus is named after Dr. Alan Stone of the U.S. National Museum in recognition of his many services to mosquito studies and, in particular, of his contribution to the *Synoptic Catalog of the Mosquitoes of the World*, recently published for the Thomas Say Foundation by the Entomological Society of America.

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ERRATA

p. 66, line 2 of legend to figure should read :

"(2) *mauretanicus marioni* subsp. n., (3) *mauretanicus major* M.-R."

p. 105, line 22 should read :

"♂ and pupal exuvium, 'Wajir, Kenya, col. 26.i.55, bred from larva 4.vii.55 . . .' "

PUBLICATIONS

The principal Publications of the Royal Entomological Society are *Transactions* and *Proceedings*.

The **Transactions** form an annual volume, each paper in the volume being issued as a separate part. The parts are issued irregularly throughout the year.

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—— 1936, New species of Coccidae. *Trans. R. ent. Soc. Lond.* **84** : 901–36.

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TO BE HELD IN THE SOCIETY'S ROOMS
41, Queen's Gate, S.W.7

1961

Wednesday, February 1
„ March 1
„ April 5

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